



(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:  
30.08.2000 Bulletin 2000/35

(51) Int. Cl.<sup>7</sup>: G01N 33/487, G01N 33/50

(43) Date of publication A2:  
21.04.1999 Bulletin 1999/16

(21) Application number: 98118218.1

(22) Date of filing: 25.09.1998

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE  
Designated Extension States:  
AL LT LV MK RO SI

(30) Priority: 29.09.1997 JP 26348397  
29.09.1997 JP 26349297

(71) Applicant:  
MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.  
Kadoma-shi, Osaka-fu, 571 (JP)

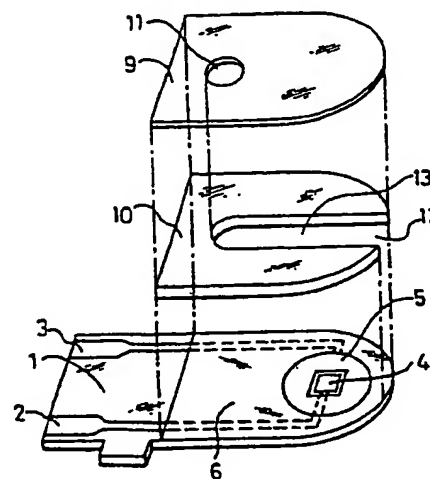
(72) Inventors:  
• Ikeda, Shin  
Katano City 576-0022 (JP)  
• Yoshioka, Toshihiko  
Hirakata City 573-0035 (JP)  
• Nankai, Shiro  
Hirakata City 573-0071 (JP)

(74) Representative:  
Dr. Elisabeth Jung  
Dr. Jürgen Schirdewahn  
Dipl.-Ing. Claus Gernhardt  
Postfach 40 14 68  
80714 München (DE)

(54) Biosensor and method for quantitative measurement of a substrate using the same

(57) A biosensor is disclosed for application to a method for quantitative measurement of a substrate comprising a first step of causing a substrate contained in a sample to react with an oxidoreductase specific to the substrate in the presence of an electron mediator in oxidized state, a second step of applying a potential to a working electrode for reducing the electron mediator in oxidized state that remains not reduced in the first step, and a third step of measuring a reduction current flowing across the working electrode and a counter electrode. The biosensor comprises an electrically insulating base plate, an electrode system having a working electrode and a counter electrode formed on the base plate, and a reaction layer which is formed on or in the vicinity of the electrode system and contains at least an oxidoreductase and an electron mediator, the counter electrode including at least a reductant of a redox compound or an electrolytically oxidizable metal.

FIG. 1





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 98 11 8218

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (InCL.8)
X	EP 0 736 607 A (KYOTO DAIICHI KAGAKU KK) 9 October 1996 (1996-10-09) * abstract * * column 1, line 45 - line 58 * * column 2, line 44 - line 55 * * column 3, line 45 - line 57 * * column 4, line 9 * * column 4, line 20 - line 29 * * column 5, line 7 - line 10 * * column 5, line 31 - column 6, line 5 * * column 8, line 16 - line 22 * ---	1-6	G01N33/487 G01N33/50 G01N33/543 C12Q1/00 G01N21/55
P,X	US 5 708 247 A (MCALEER JEROME F ET AL) 13 January 1998 (1998-01-13) * abstract * * figure 3 * * column 5, line 16 - line 29 * * column 6, line 20 - line 57 * * claims 32-34 * ---	6	
A	US 5 413 690 A (KOST KENT M ET AL) 9 May 1995 (1995-05-09) * abstract * * column 2, line 31 - line 51 * * column 3, line 9 - line 23 * * column 4, line 25 - line 59 * * column 5, line 63 - column 6, line 33 * * column 6, line 45 - line 50 * * column 8, line 12 - line 18 * * claim 1 * ---	1-6	TECHNICAL FIELDS SEARCHED (InCL.8)  G01N C12Q
A	EP 0 685 737 A (MATSUSHITA ELECTRIC IND CO LTD) 6 December 1995 (1995-12-06) * abstract * * page 1, line 53 - page 2, line 25 * * claims 1-17 * * figures 1-3 * ---	1-6	
-/--			
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>11 July 2000</b>	Examiner <b>Angelié, E</b>
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document	



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 98 11 8218

DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
P, A	EP 0 856 586 A (MATSUSHITA ELECTRIC IND CO LTD) 5 August 1998 (1998-08-05) * abstract * * column 1, line 1 - line 6 * * figure 1 * * claims 1-10 * * column 1, line 20 - line 30 * -----	1-6
		TECHNICAL FIELDS SEARCHED (Int. Cl. 6)
The present search report has been drawn up for all claims		
Place of search	Date of completion of the search	Examiner
THE HAGUE	11 July 2000	Angelië, E
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>		

EPO FORM 1503 03.02 (P04001)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 96 11 8218

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-07-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0736607 A	09-10-1996	JP 8278276 A	22-10-1996
		CN 1139757 A	08-01-1997
		EP 0971036 A	12-01-2000
		US 5720862 A	24-02-1998
US 5708247 A	13-01-1998	AU 715340 B	20-01-2000
		AU 2269297 A	02-09-1997
		CA 2245941 A	21-08-1997
		EP 0880692 A	02-12-1998
		US 5951836 A	14-09-1999
		WO 9730344 A	21-08-1997
US 5413690 A	09-05-1995	CA 2167822 A	02-02-1995
		EP 0710358 A	08-05-1996
		JP 9500727 T	21-01-1997
		WO 9503543 A	02-02-1995
EP 0685737 A	06-12-1995	JP 3027306 B	04-04-2000
		JP 8050113 A	20-02-1996
		CA 2150791 A,C	03-12-1995
		US 5575895 A	19-11-1996
EP 0856586 A	05-08-1998	JP 10221293 A	21-08-1998
		CN 1196482 A	21-10-1998
		US 6077408 A	20-06-2000

EPO FORM P0499

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82